



**COMMENTS ON  
FEASIBILITY STUDY REPORT FOR HIGH  
PRIORITY SITES (881 HILLSIDE AREA) VOL. I  
ROCKY FLATS PLANT**

The comments that follow are based on the subject Feasibility Study (FS) as a stand alone document, supported only by the accompanying appendices in Volume II. This review focused on the FS report proper presented in Volume I. The Risk Assessment, which was included as Appendix 1 in Volume II was not reviewed.

**General Comments**

**Chapter 1** This introductory chapter should set the tone for the entire FS by presenting pertinent background data in a manner that makes clear the nature and extent of contamination and risks, as well as the remedial objectives.

This chapter presents considerable text, presumably derived from the Remedial Investigation (RI). However, it is not clear whether the information presented reflects the July 1987 RI report, or if it addresses subsequent changes to the RI report, which was resubmitted on March 1, 1988, the same date as FS submittal.

The first chapter provides several pages of site background and contamination information, presumably from the RI. Chapter 1 tends to provide conclusive information without the benefit of supporting summary data tables and figures. Consequently, it gives the impression of being an incomplete account of the site situation. Comparisons to background are made and should be minimized. When used, background levels should be defined in terms of remediation standards or objectives, however, emphasis should be placed on comparisons with Applicable or Relevant and Appropriate Requirements (ARARs). The present text should be revised to incorporate summary tables and to eliminate any conclusions (or opinions) that are not supported by information presented in the text. One approach may be to reprint the RI executive summary and conclusions, citing them as the basis for the remedial objectives. The objectives themselves should be presented as clear, concise, site-specific action items.

**Chapter 2** This chapter on technology screening should be expanded to show how the screening was conducted and how the results will be used in remedial alternative development and evaluation. This would help not only in the reader's understanding of the process, but also in the consistent application of evaluation criteria during the screening process.

The present technology screening discussions are out of balance. Some technologies are retained or dismissed based on scant discussion; others, particularly groundwater treatment methods, go into extensive detail without apparent need. Also, cost seems to be inconsistently applied as a screening factor among the various technologies presented.

**Chapters 3-6** These chapters collectively deal with remedial alternative development and evaluation. While the overall presentation appears to be somewhat consistent with the June 1985 EPA FS guidance, several factors bear some consideration. First of all, the current National Contingency Plan (NCP) and FS guidance specify that at least one alternative representing each of five categories of remediation be developed. These

categories are closely related to ARARs. Discussion early in the text explains how ARARs are defined by EPA but it is not apparent how the ARARs are applied to the evaluation of the alternatives acceptability. An extensive listing of ARARs and potential ARARs is presented in the appendices but again their application is unclear. In addition the effects of EPA Land Disposal Restrictions on the regulatory acceptability of the alternatives presented is not discussed.

It is noted that the NCP and 1985 guidance document do not reflect Superfund Amendments and Reauthorization Act (SARA) mandates. In particular EPA now indicates that alternatives development should emphasize protection of human health and the environment (HH&E). They now suggest that meeting ARARs alone may not be fully protective of HH&E.

In some instances alternatives are rejected on the basis of technology uncertainties (e.g. Alternative 4) which suggests that the technology should not have passed the initial technology screen. This implies several possible considerations: remedial objectives may not have been defined so as to limit technology selection; technology screening may not have been sufficiently rigorous; alternatives development may not have been based on appropriate technologies; or alternatives development may have been approached more randomly than systematically. Regardless the general impression is that perhaps the incorrect set of alternatives is being evaluated in the first place. One way to improve that apparent weakness is to present more objective or quantitative data (such as modeling and site data) in the evaluation.

It is not clear from the text that the provisions of SARA as applicable to the FS are entirely understood. While SARA does not encourage transporting wastes from one location to another as a solution, it does not prefer waste encapsulation or other passive source control measures over treatment measures. In fact, SARA emphasizes the need for measures that reduce volume, mobility or toxicity of wastes. Yet in some cases alternatives are evaluated as being in compliance with SARA because they control the source without treatment.

Costs do not appear to be appropriately supported or utilized in the evaluations. SARA encourages cost-effective solutions and the NCP and 1985 FS guidance specify that costs may be a screening factor within a particular category of remediation but not between categories. From the text, it is unclear which alternatives fit which of the five NCP categories. Some alternatives are screened out on a cost basis even though other retained alternatives may have similar cost estimates. This prevents an effective cost comparison among all evaluated alternatives to assess relative costs and benefits. Moreover, it is not clear from the data presented how the costs were derived. Present worth estimates for each alternative in Chapter 3 differ from the present worth presented for four of the same alternatives in Chapter 4. Appendix 3 in Volume II provides costing details for capital costs only. The factors and assumptions built into the annual and present worth cost estimates do not appear to be presented in any detail. Based on Table 4-8 (Cyclic Costs Component Work Sheet for four alternatives) it is not apparent if labor and administrative costs are included in the annual cost estimates. If not, it is unlikely that the estimate will fall within the 30% to +50% required accuracy range.

SARA requires that alternatives be cost effective. The intent of Congress in enacting SARA (Congressional Record Oct. 3, 1986, p. H9102) is clear. Here Congress indicates that "cost effectiveness" means that one first determine the appropriate level of protection for HH&E to be achieved and then select a cost effective means of

achieving this goal Only after ARARs are met is it appropriate to consider cost effectiveness it does not appear that the FS complies with SARA in this regard

It should also be noted that the NCP and EPA FS guidance are in the process of changing According to guidelines in current 1988 draft revisions to the NCP and to the FS guidance nine principal criteria must be considered in the evaluation and comparison of remedial alternatives These criteria cited in EPA Office of Solid Waste and Emergency Response (OSWER) Directive 9355 0-21 (July 24 1987) are

- Compliance with ARARs
- Reduction of waste toxicity mobility or volume
- Short term effectiveness
- Long-term effectiveness and permanence
- Implementability
- Cost (note Congressional intent)
- Community acceptance
- State acceptance
- Overall protection of HH&E

**Specific Comments**

- P 1 5 ¶ 1 The "potential sources of environmental contamination" referred to here should be identified at least those relevant to the 881 Hillside FS
- P 1 5 ¶ 2 The text should characterize the "portions of this land" that have been converted to housing in terms of size extent, population, and relationship to the Rocky Flats Plant (RFP) site
- P 1 5 ¶ 3 The text should address transient (i.e. worker or commuter) populations that could affect exposure concerns both on and off the RFP
- P 1 6 ¶ 1 The locations of potentially-sensitive populations such as schools should be expressed more accurately than "in the same general area but somewhat farther" Also two reservoirs east of the RFP shown in Figure 1-2 are not mentioned in the text.
- Plate 1-4 Solid Waste Management Units (SWMUs) no 104 and 177 are not shown on this drawing. If they have been purposely excluded the text should provide an explanation.
- P 1 12 ¶ 4 It seems that the description of SWMUs no 119 1 and 2 could be expanded For example data from the Comprehensive Environmental Assessment and Response Program (CEARP) Phases 1 and 2 may provide information regarding quantities stored spills areas affected etc.
- P 1 12 ¶ 5 It is unclear if the plutonium activity level reported for this area is the 1986 reported level or the level at time of disposal between 1969 and 1972 The current activity level should be provided if available
- P 1 13 ¶ 3 The Fountains Formation is not shown in Figure 1 5 as stated
- P 1 14  
Fig 1 5 There are 2 Upper Laramie Formations indicated Perhaps one should be the Arapahoe Formation which is not shown here Laramie is misspelled

- P 1 15 ¶ 1 The "low permeability" of the Upper Laramie Formation mentioned in line one is not defined. The statement that this formation is the base of the hydrologic system beneath the plant needs more support. The hydrogeologic characteristics of the Lower Laramie should be described including the presence of fractures, joints, and structures beneath and neighboring the RFP.
- P 1 17 ¶ 2 While gravel layers may be significant, the properties of the alluvial, colluvial, and fill materials that also may contribute to contaminant transport should be summarized.
- P 1 19 ¶ 2 "Relatively impermeable" should be defined. The size of the area affected by the bedrock high east of Building 881 and the direction of diverted groundwater flow should be described.
- P 1 21 ¶ 2 The selection of input parameters used to calculate groundwater flow rate should be justified. The remarks made about a molecule traveling 10,000 feet in 30 years are misleading since they appear to ignore the mass and extent of a contaminant plume that may be present. Also, they seem inconsistent with the "quite dynamic" shallow groundwater flow system described on the preceding page in which large water level changes would affect hydraulic head and consequently contaminant transport.
- P 1 22 ¶ 2 This paragraph should be rewritten so that the conditions described and the conclusions drawn about low hydraulic conductivity can be more readily understood.
- P 1 24 ¶ 2 It is unclear if the first sentence is intended to refer to a distinct difference between upgradient and downgradient groundwater conditions, or between groundwater and general (but undefined) plant background conditions.
- P 1 25 ¶ 4 This last paragraph in item 4 does not seem objective. The words "actually quite low" should be deleted and the data simply compared to the standard. Additional discussions, including the presentation of the isotopic ratios, are necessary to support the conclusion that the uranium isotopes reported are of natural origin.
- P 1 26 ¶ 1 The distance and direction to the nearest downgradient well should be provided.
- P 1 27 ¶ 2 Provide data to support the statement that groundwater flow "is probably low and of small quantity."
- P 1 27 ¶ 3 Define the "low permeability" of "most of the colluvium."
- P 1 28 ¶ 3 Delete "rather low."
- P 1 29  
Data table It is unclear what the "U" stands for.
- P 1 30 ¶ 3 No data were presented in this chapter to correlate potential or observed groundwater contamination with specific SWMUs. Therefore, the statement limiting degradation to only four of twelve SWMUs is not supported. It is unclear if the FS intends to address remediation of only these four SWMUs.
- P 1 31 ¶ 2 The statement regarding "leaching of naturally occurring elements from waste disposed" seems contradictory and does not lend any assurance that actual or potential contamination is not occurring. Use of the terms "may result" and "may reflect" does not lend certainty to the conclusion being made.

- P 1 32 ¶ 3** The validity of using Draeger Tube readings in outdoor ambient air for risk level remediation decision making seems highly questionable
- P 1 32 ¶ 4** It is unclear which "obvious stress" was looked for in the biota. Available data on plant and animal contaminant uptake, particularly of strontium and the uranium isotopes, should be used if broad conclusions on ecological impact are to be made.
- P 1 33 through 1 37** Section 1 3 on ARARs appears to be a recitation of EPA's guidance on this topic. The section does little to explain why or how ARARs are used in the Rocky Flats FS process and seems out of context in Chapter 1. It would seem more appropriate to address the hows and whys of ARARs in the context of FS screening criteria, which should be discussed elsewhere in the text. The discussion of EPA's guidance could be abbreviated and placed in the appendices or deleted entirely unless specific points from the guidance are being made.
- The example of "applicability" cited on P 1 33 ¶ 3 is incorrect. In point of fact, the Land Disposal Restrictions may be regarded as "relevant and appropriate" or "other" under certain circumstances.
- P 1 37 Source** A more recent document, "CERCLA Compliance with Other Laws" dated May 6, 1988 is now available.
- P 1 37 through 1 39** The objectives should be the culmination of all the data and conclusions discussed in Chapter 1. Instead, the brief discussion presented centers only on vague generalities rather than site-specific action items. Site-specific objectives are relegated to two "issues and pathways" in Table 1 1, which are not discussed within Section 1 4. This section should be rewritten so that the data and site conditions discussed throughout Chapter 1 are cogently and succinctly linked with the remedial action necessary at the site by area, media, and/or contaminants as appropriate. The discussion of general response actions would be better presented at the beginning of Chapter 2 (Technology Screening). Also, elimination of Section 1 3 (ARARs) would help editorially in making the transition from site background data to remediation objectives.
- P 2 1 ¶ 1** This introductory section should lay out the ground rules/criteria/procedures by which the technology screening is conducted. It should include discussion of general response actions and how they (and specific technologies) will address the site-specific objectives that should be set forth in Chapter 1.
- P 2 3 ¶ 3** Comparison to background levels is insufficient. Risk assessment conclusions regarding soil radionuclides should be cited to support the point. Also, the presence of uranium isotopes in those soils could invalidate the conclusion regarding the need for mixed waste facilities.
- P 2 10 through 2 17** Throughout the discussion of infiltration controls, there was no mention of the amount of infiltration that could be expected, thus affording a relative comparison of control methods. While the multi-media cap appears to be a technically acceptable cap for further evaluation, a far less costly cap could prove to be equally effective. RCRA minimum technical requirements, which don't necessarily require a full RCRA cap, should be discussed.

- P 2 17 ¶ 2 The discussion of in situ treatment "to expedite the remediation of groundwater seems to be very inconsistent with the earlier dismissal of thermal soil treatment on page 2 3
- P 2 19 ¶ 3 Does not vitrification have the potential for immobilization of strontium and the uranium isotopes? What about for the plutonium activity at SWMU no 130? Since vitrification was recently chosen for application at Pristine Ohio site it would appear there are data to justify its possible consideration and it should not be dismissed solely on the basis of limited previous applications.
- P 2 25 ¶ 2 The concluding statement dismissing this (and any other) technology should cite specific reasons
- P 2 25 ¶ 4 Depth limitations to easily maintain in situ anaerobic bioreclamation should be explained
- P 2 34 ¶ 2 Treatability studies could be performed to predict the effectiveness of this method Therefore this alternative should not be dismissed solely on the basis of lack of performance data
- P 3 1  
Item 2 These are general not specific objectives
- P 3 2  
Item 4 The regulatory citations do not specifically address source control or offsite remedial actions as stated but instead identify seventeen considerations for assessing remedial actions. This error apparently originated in the 1985 EPA FS guidance which is the apparent source of the statement. The sentence reading "These source control measures adequately address " is an unsupported conclusion that should be deleted or further explained
- P 3 2  
Item 5 This list should be expanded to address the nine evaluation criteria mentioned on page 3 of these comments
- P 3 2  
Item 6 According to the FS guidance cost cannot be used to eliminate an alternative from consideration unless there is another alternative that provides the same level of remediation (see the general comment on cost-effectiveness)
- P 3 3 ¶ 1 Delete "welfare "
- P 3-3  
through  
3-51  
(Sec 3 2 3 4) There is no transitional discussion that shows how these alternatives were developed from the technologies discussed in Section 2 The preceding discussion in Section 3 1 served only to itemize the various requirements and considerations that go into the preliminary screening Also there is no apparent attempt made to place the listed alternatives into the five categories required under the NCP What is needed is a discussion that presents the rationale for combining the technologies into the alternatives presented which would also provide justification why other likely combinations were not selected One approach that may be taken is to first place the alternatives in the NCP categories (based on perceived performance from the technology screening) then perform the preliminary screening such that cost effectiveness conclusions can be reached within each category consistent with both SARA and the FS guidance Then only the most cost effective alternative from each category would be carried forward to the detailed evaluation These should be clearly summarized by NCP category in what is now Section 3 4 While this approach initially may possibly create more than the eight alternatives listed in Section 3 2 the

- end result should be a more defensible argument for the ultimate selection of a preferred alternative
- P 3 9  
Alt. 2      The method for determining the numbers of extraction wells and their locations depths and pumping rates should be described
- P 3 11 ¶ 2      Define "eventually "
- P 3-13  
Alt. 3      It appears that the french drain intercept is upgradient of SWMUs 102 and 107
- P 3-20 ¶ 2      The rationale and expected results for selecting ten pore volumes should be stated  
Anticipated cleanup levels should be established
- P 3 27 ¶ 1      The conclusion that Alternative 3 is "equally effective" should be justified. The statement that one is significantly more costly than the other is inaccurate since the estimated present worth cost estimate difference is only \$50 000. (Both alternatives 3 and 4 could properly be estimated at \$2.4 million present worth)
- P 3 27 ¶ 2      Is the bedrock fractured?
- P 3-30 ¶ 1      The "small volume of water" should be quantified
- P 3 30 ¶ 4      SARA appears to be misinterpreted here. SARA prefers treatment alternatives in that they reduce waste volume, mobility, and toxicity. Also, Land Disposal Restrictions could affect implementability of this alternative.
- P 3 30 ¶ 5      An Alternate Concentration Limit (ACL) would have to be issued for the contaminated groundwater flow to be allowed to continue.
- P 3 27 ¶ 1      Alternative 4 is rejected on the basis of undocumented capability of soil flushing. If so, soil flushing probably should not have passed technology screening.
- P 3 27  
Alt. 5      This alternative acknowledges that downgradient contamination will be left uncontrolled. Furthermore, the alternative is stated not to meet ARARs but meets RCRA closure requirements. These statements are inconsistent.
- P 3-38 ¶ 3      The term "significantly reduce" should be quantified
- P 3-40 ¶ 3      Not meeting ARARs would appear to be a sufficient reason to reject this alternative
- P 3-42 ¶ 2      The Land Disposal Restrictions could adversely affect implementability of this alternative
- P 4-1 ¶ 1      It is not clear which of the five NCP remedial alternative categories are represented by the four alternatives identified here
- P 4-1 ¶ 4      This section, entitled "Introduction," would be better identified as a discussion of the evaluation criteria
- P 4-2 ¶ 1      The list of evaluation criteria should be amended to address the nine criteria listed in the July 1987 OSWER directive



P 4-5  
through  
4-22  
(Section 4 2)

This separate section for evaluating groundwater treatment systems is unnecessary and should have been resolved in Section 2 Technology Screening especially since groundwater treatment is included in each of the remaining alternatives (except No Action) Since groundwater treatment is a component technology (or operable unit) of the alternative any further comparative evaluation of cost and non-cost factors is redundant and tends to complicate the document. Discussion should be limited to the additional cost and implementation details of the preferred treatment technology which have not been previously presented Evaluative discussions should then focus on the alternatives as complete entities

P 4-25  
through  
4-38

The detailed evaluation of the four remedial alternatives as presented in these pages adds little to the information already presented in Section 3 From a purely practical standpoint, it would make sense to merge the related discussions from Section 3 into 4 leaving Section 3 to address the development, categorization and initial screening of remedial alternatives In this manner much of the evaluative detail currently found in Section 3 dealing with all of the alternatives can be shifted in to Section 4 where the final and presumably shorter list of alternatives can be evaluated in detail This will help in applying the evaluation criteria uniformly thus providing better support for retaining or eliminating alternatives. The revised evaluation discussion should address the nine evaluative criteria specified in the 1987 OSWER directive Also the alternatives should be evaluated as complete units not in pieces, in order to facilitate comparisons among them

p 4-37  
through  
4-43  
(Section  
4 3 4 3)

The logic in presenting an additional discussion of ARARs in this section is not apparent. It would be sufficient to identify the relevant ARARs in an earlier section of the report, and in the detailed evaluation simply indicate whether or not the ARARs will be met by the alternative

P 4-43  
through  
4-52  
(Section 4 4)

It would be better to simply indicate the capital and present worth costs for each alternative within their respective discussions. The "work sheets" and cost analyses presented as Tables 4-7 through 4-13 add little to the evaluation and would be better placed in the appendices

From the information presented in Tables 4-7 and 4-8 it is not clear if all reasonably expected direct and indirect costs have been incorporated into the estimates. Some cost factors that may be considered include but are not limited to materials and labor associated with testing mobilization excavation transportation and disposal soil expansion factors as they may affect removal and/or backfill volumes burden and overhead factors on labor materials subcontracts etc health and safety cost factors and factors for engineering management, and contingencies. It is useful also if possible to incorporate factors reflecting the facility operator's increased administrative and management costs associated with implementing the costed remedial actions. While many of these factors may have been addressed it is not clear in Tables 4-7 and 4-8 or in Appendix 3 what factors markups fees etc were actually applied Also there is no explanation as to why cost estimates in Section 4 differ from those presented in Section 3

Chapter 5

The format for the summary of alternatives appears to be acceptable However it is not evident from Table 5-1 which of the five NCP specified remedial categories are represented by the alternatives presented Also it is not clear why five alternatives are summarized when only four were evaluated in detail

## **Chapter 6**

**As presented this chapter is superfluous. All it seems to present are additional details on the components of the recommended alternative. If the preferred alternative is to be presented it should be done in a manner that explains why it should be selected, pointing out the pros/cons and costs/benefits that make it a better choice than the remaining alternatives. Such a discussion should follow naturally from the summary presented in Chapter 5.**